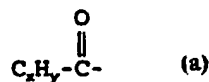
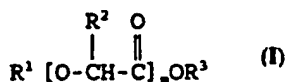


## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification <sup>6</sup>:</b> <b>A61K 7/02, 7/50</b>	<b>A1</b>	<b>(11) International Publication Number:</b> <b>WO 95/05145</b> <b>(43) International Publication Date:</b> 23 February 1995 (23.02.95)
<b>(21) International Application Number:</b> PCT/EP94/02670 <b>(22) International Filing Date:</b> 10 August 1994 (10.08.94) <b>(30) Priority Data:</b> 9316984.5                      13 August 1993 (13.08.93)                      GB <b>(71) Applicant (for AU BB CA GB IE KE LK MN MW NZ SD TT only):</b> UNILEVER PLC [GB/GB]; Unilever House, Blackfriars, London EC4P 4BQ (GB). <b>(71) Applicant (for all designated States except AU BB CA GB IE KE LK MN MW NZ SD TT):</b> UNILEVER NV [NL/NL]; Weena 455, NL-3013 AL Rotterdam (NL). <b>(72) Inventors:</b> LYLE, Ian, Gardner; 60 Highland Avenue, Aston Park, Deeside, Clwyd CH5 1XQ (GB). ROSSER, David, Arthur; The Sycamores, The Mount, Heswall, Wirral, Merseyside L60 4RD (GB). <b>(74) Agent:</b> BRYANT, Tracey; Unilever plc, Patent Division, Colworth House, Sharnbrook, Bedford MK44 1LQ (GB).		<b>(81) Designated States:</b> AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, ES, FI, GB, GE, HU, JP, KE, KG, KP, KR, KZ, LK, LT, LU, LV, MD, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SI, SK, TJ, TT, UA, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, MW, SD).  <b>Published</b> <i>With international search report.          Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>

BEST AVAILABLE COPY

**(54) Title:** CLEANSING COMPOSITION CONTAINING HYDROXY ALKANOATE DERIVATIVES**(57) Abstract**

A skin cleansing composition for topical application to the human skin to remove make-up is an oil-in-water emulsion, containing an emulsifier system which comprises a hydroxy alkanooate derivative compound of general formula (I), wherein  $R^1$  is H- or (a),  $R^2$  is H- or  $C_pH_q$  preferably  $CH_3$ ,  $R^3$  is H-,  $C_xH_y$ -, or a metallic, ammonium, or alkylammonium cation, p is from 1 to 18, q is from 3 to 37, x is from 2 to 20, y is from 3 to 43, and m is from 1 to 3, provided that when  $R^1$  is H-, then  $R^3$  is  $C_xH_y$ -, and when  $R^1$  is  $C_xH_yCO$ -, then  $R^3$  is H-, or a metallic, ammonium or alkylammonium cation.

**FOR THE PURPOSES OF INFORMATION ONLY**

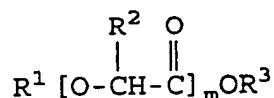
Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	GB	United Kingdom	MR	Mauritania
AU	Australia	GE	Georgia	MW	Malawi
BB	Barbados	GN	Guinea	NE	Niger
BE	Belgium	GR	Greece	NL	Netherlands
BF	Burkina Faso	HU	Hungary	NO	Norway
BG	Bulgaria	IE	Ireland	NZ	New Zealand
BJ	Benin	IT	Italy	PL	Poland
BR	Brazil	JP	Japan	PT	Portugal
BY	Belarus	KE	Kenya	RO	Romania
CA	Canada	KG	Kyrgyzstan	RU	Russian Federation
CF	Central African Republic	KP	Democratic People's Republic of Korea	SD	Sudan
CG	Congo	KR	Republic of Korea	SE	Sweden
CH	Switzerland	KZ	Kazakhstan	SI	Slovenia
CI	Côte d'Ivoire	LI	Liechtenstein	SK	Slovakia
CM	Cameroon	LE	Sri Lanka	SN	Senegal
CN	China	LU	Luxembourg	TD	Chad
CS	Czechoslovakia	LV	Latvia	TG	Togo
CZ	Czech Republic	MC	Monaco	TJ	Tajikistan
DE	Germany	MD	Republic of Moldova	TT	Trinidad and Tobago
DK	Denmark	MG	Madagascar	UA	Ukraine
ES	Spain	ML	Mali	US	United States of America
FI	Finland	MN	Mongolia	UZ	Uzbekistan
FR	France			VN	Viet Nam
GA	Gabon				

Cleansing composition containing hydroxy alkanoate derivatives.

- 5 This invention relates to cleansing compositions. In particular, it relates to emulsion compositions of the oil-in-water type, which provide suitable wipe-off or rinse-off make-up removing and skin cleansing compositions.
- 10 Emulsion type make-up removing compositions, containing oil, water and a surfactant, are known. However, conventional compositions provide a less than satisfactory performance, in terms of either their ability to remove make-up, or their aesthetic and sensory properties. In
- 15 the case of oil based formulations, whilst these usually provide satisfactory make-up removal, they usually leave the user with a greasy afterfeel on the skin. With aqueous based products, there is a tendency for these to leave the skin feeling dry and tight after use.
- 20 The compositions of the current invention aim to remedy one or more of the deficiencies of the known compositions. In particular, it is an object of the invention to provide cleansing compositions which provide good cleansing and
- 25 afterfeel properties. Preferably these will also confer to the skin a long term moisturising benefit.
- 30 Thus, according to the invention, there is provided a cleansing composition suitable for topical application to the human skin, comprising an oil-in-water emulsion system which comprises a hydroxy alkanoate derivative compound having the following general formula:

- 2 -



5

wherein

$$R^1 \text{ is H- or } C_xH_y-\overset{\overset{O}{||}}{C}-$$

$$R^2 \text{ is H- or } C_pH_q-$$

10

$$R^3 \text{ is H-, } C_xH_y-, \text{ or a metallic, ammonium, or alkylammonium cation,}$$

$$p \text{ is an integer from 1 to 18}$$

$$q \text{ is an integer from 3 to 37}$$

$$x \text{ is an integer from 2 to 22,}$$

15

$$y \text{ is an integer from 3 to 43, and}$$

$$m \text{ is an integer from 1 to 3,}$$

20

provided that when  $R^1$  is H-, then  $R^3$  is  $C_xH_y-$ , and when  $R^1$  is  $C_xH_yCO-$  then  $R^3$  is H-, or a metallic, ammonium or alkylammonium cation.

25

The invention also provides a method of removing make up from skin by applying a composition as above to the skin, and then wiping, washing or rinsing the emulsion from the skin.

30

The hydroxy alkanoate derivative above will generally function as an emulsifier which is part of all of an emulsifier system. However, it may be included as at least part of the oil of the emulsion - this applies particularly to lipophilic alkyl esters of hydroxy alkanoic acids, (in which compounds,  $R^1$  above is H)

35

The hydroxy alkanoate derivatives employed in compositions according to the invention provide the cleansing composition with desirable properties, in the sense that they may not only act as an emulsifier within the composition, thereby stabilising the oil-in-water

emulsion, but can also be beneficially metabolised in the skin.

During this process, naturally occurring enzymes in the skin cleave the hydroxy alkanoate derivative in the composition to generate lactic acid or glycolic acid (depending on whether  $R^2$  is H or  $CH_3$ - in the above general formula), which may then permeate further through the skin. In particular, it is thought that the derivatives described penetrate the skin more readily than glycolic or lactic acids themselves, which are relatively hydrophilic.

Absorption of lactic acid, glycolic acid or other hydroxy alkanoic acid into the skin is desirable, because these compounds have a humectant action, they provide a moisturisation benefit, and they also improve the condition and feel of skin.

It has also been found to be a highly desirable aspect of the invention that the hydroxy alkanoate derivative used in compositions according to the invention has an hydrophilic/lipophilic balance (HLB) value of less than about 5.5. It is suspected that hydroxy alkanoate derivatives with this range of HLB values may more readily partition into the skin, and hence deliver a cosmetic benefit more deeply in the skin, because of their hydrophobicity.

In the formula given above  $R^2$  is preferably H or  $CH_3$ , more preferably  $CH_3$  so that the compound is a derivative of glycolic or lactic acid.

Lactic acid derivatives are readily available commercially, and preferred for this reason. However, homologues of the lactic derivatives are accessible and can also be used.

- 4 -

Acyl derivatives of 2-hydroxy alkananoate acids in which  $R^2$  is  $C_pH_q$  - and  $p$  is 2 or more can be made by reaction of an acyl halide with the 2-hydroxy alkananoic acid. Alkyl esters of 2-hydroxy alkananoic acids can be prepared by  
5 esterification of those acids.

If  $R^2$  is  $C_pH_q$  - and  $p$  is 2 or more, then  $p$  is preferably in the range 2 to 12, more preferably 2 to 6.

10 According to one preferred aspect of the invention, the hydroxy alkananoate derivative in the cleansing composition is an acyl lactylate; that is, in the general structure shown above,  $R^3$  is H-,  $R^2$  is  $CH_3$  and  $R^1$  is  $C_xH_yCO-$ . In a particularly preferred variant of acyl lactylates, in  $R^1$  x  
15 is between 14 and 20, and is most preferably 17.

In a further preferred variant of acyl lactylates, the  $R^3$  species is a metallic cation which provides a relatively insoluble acyl lactylate species, such as a calcium or magnesium cation. A most preferred embodiment of the  
20 invention comprises calcium stearoyl lactylate, which has an HLB value of 5.1. Using such a relatively insoluble acyl lactylate may provide particularly beneficial properties to the composition.

25 Acyl lactylates are anionic surfactants, and are conveniently prepared by coupling lactic acid to long chain fatty acids via the alpha hydroxy group on the lactic acid. Such acyl lactylates surfactants are believed to readily break down in the skin to provide  
30 lactic acid, thereby providing the aforementioned beneficial absorption of lactic acid into the skin.

Another preferred category of hydroxy alkananoate derivatives for use in cleansing compositions according to  
35 the invention are alkyl lactates; that is  $R^1$  is H- and  $R^2$  is  $CH_3$ , and  $R^3$  is  $C_xH_y$ . In a more preferred embodiment, x

in  $R^3$  is between 6 and 20, more preferably 12 and 18. In the most preferred embodiment,  $R^3$  is 14.

Alkyl lactates are weak nonionic surfactants, in which the lactic acid moiety is linked to a long chain fatty alcohol through its carboxylate group. Alkyl lactates surfactants are essentially water insoluble, and therefore may provide a relatively poor foaming ability when compared to acyl lactylate surfactants, but may beneficially be used in compositions according to the invention, because of their ability to partition into the skin. This ability is often superior to that of the anionic acyl lactylate surfactants.

It is a characteristic of certain preferred embodiments of the invention that they may provide compositions which are relatively stable in use, thereby providing compositions which are commercially more attractive. By stable it is meant that the emulsion does not visibly breakdown to its constituent phases within one month of being prepared, in temperate conditions.

A preferred alkyl lactate for use in compositions according to the invention is myristyl lactate. This alkyl lactate has a very low HLB value, in the region 1-3.

The concentration of the hydroxy alkanoate derivative of the general structure above in the composition is typically 0.5-10% by weight of the composition. However, the hydroxy alkanoate derivative of the general formula discussed is typically only one emulsifier which may be part of an emulsifier system used in compositions according to the invention. If used, such other emulsifiers may be used to make the total level of emulsifier system in compositions according to the invention to be between 0.5-10% by weight, more preferably 1-7% by weight.

- 6 -

Such other emulsifiers as may be used in the emulsifier system according to the invention may include any emulsifier or combination of emulsifiers which has an average HLB value of greater than 6, more preferably greater than 9, and may be readily selected from any textbook on the subject.

The oil phase of compositions according to the invention may comprise mineral oils, hydrocarbons, silicone oils, triglyceride/ester oils, or mixtures thereof. Preferred oils are those which are particularly effective at solubilising the oil components of make up. Particularly preferred oils for use in compositions according to the invention are hydrocarbon oils, such as isoparaffins, polydecene and polybutene, mineral oils and esters which contain a saturated or unsaturated, straight or branched chain  $C_{8-22}$  alkyl or alkenyl group, for example isopropylmyristate, hexyl laurate, methyl laurate, 2-ethylhexyl palmitate, 2-octadecyl myristate, isopropylpalmitate, and triglycerides such as glyceryl tricaprylate/caprate (eg ESTOL, ex. Unichema), glyceryl tri-isostearate (eg PRISORINE, ex. Unichema), and glyceryl tri- (2-ethylhexanoate) (eg MYRITOL GTEH, ex. Henkel).

Preferably, the composition comprises a hydrocarbon oil, or a hydrocarbon oil in combination with an ester oil as described above.

Particularly preferred oils for use in compositions according to the invention are isoparaffin and polydecene. These components are preferred components in the oil phase, since they are particularly effective in blending into and lifting a certain resilient make-up compositions which are typically resistant to removal, such as for example water-proof eye make-ups.



- 7 -

Preferably, the oil is present in the composition at a level of 3-60%, more preferably 10-40% by weight of the composition.

- 5 The water in compositions according to the invention may preferably comprise from 95-40%, more preferably 90-50% by weight of the composition.

The composition according to the invention may  
10 additionally comprise further adjuncts as are typically found in such cleansing compositions. These may typically include;

- thickeners, such as carbomers, xanthan gum, hectorite, and fumed silica,
- 15 - humectants, such as glycerol, propylene glycol, dipropylene glycol, sorbitol, and 2-pyrrolidone-5-carboxylate,
- perfumes,
- colourants,
- 20 - preservatives, such as salicylic acid, p-hydroxybenzoate esters, and 2-bromo-2-nitropropane-1,3-diol,
- antioxidants, such as butylated hydroxy toluene, tocopherol, and butylated hydroxy anisole,
- 25 - short-chain monohydric alcohols, such as ethanol and isopropanol,
- skin conditioners, such as polyquaternium 10 and PEG-7 glyceryl cocoate,
- germicides, such as triclosan and cetrimide, and
- 30 - plant extracts, such as aloe vera, cornflower, witch hazel, elderflower, and cucumber.

Products according to the invention may take any convenient product form, and as such may be in the form of  
35 lotions, creams, or may be readily combined in known ways with a suitable propellant to provide a product in mousse form.

- 8 -

Examples

The invention will now be demonstrated with reference to the following example:

		<u>Composition (%w/w)</u>	
<u>Component</u>		<u>1</u>	<u>2</u>
	Ethylflo 362 NF (1)	20.0	20.0
	Permethyl 101A (2)	10.0	10.0
10	Cremophor RH40 (3)	2.0	-
	Cremophor A6 (4)	-	2.00
	Renex 30 (5)	0.30	0.30
	Alfol 1618 (6)	3.00	3.00
	Crodamol ML (7)	3.00	-
15	Crolactil CSL (8)	-	5.00
	Nipasol M (9)	0.10	0.10
	Nipagin M (10)	0.20	0.20
	Carbopol 980 (11)	0.30	0.30
	Triethanolamine	0.40	1.36
20	Water	60.70	57.74
		(pH 6.6)	(pH 5.9)

- (1) Polydecene dimer, ex. Ethyl Co.
- 25 (2) Isohexadecane, ex. Waren Empfänger
- (3) PEG-40 hydrogenated castor oil, ex. BASF
- (4) Ceteareth-6 and Stearyl alcohol, ex. BASF
- (5) Trideceth-12, ex. ICI
- (6) Cetearyl alcohol, ex. Condea
- 30 (7) Myristyl lactate, ex. Croda
- (8) Calcium stearoyl lactylate ex. Croda
- (9) Propyl paraben, ex. Nipa Labs.
- (10) Methyl paraben, ex. Nipa Labs.
- (11) Carbomer, ex. Goodrich

35

Compositions 1 and 2 were prepared by blending together the components of the composition as shown.

Preparation method

5

Compositions 1 and 2 were prepared according to the following general method.

10 Firstly the aqueous phase is prepared by blending the Nipagin and triethanolamine with an aliquot of water, and heating the mixture to 70-80°C. The oil phase is then prepared by adding the Ethylflo 362 NF, Permethyl 101A, Cremophor RH40, Renex 30, Alfol 1618, Nipasol, and the hydroxy alkanoate derivative to a container and heating to  
15 70-80°C. The oil phase is then blended into the aqueous phase using a Silverson mixer.

Into this is blended the polymeric thickener, which is pre-prepared by adding the Carbopol gradually, with  
20 stirring, into the remaining water, and subsequently heating this to 70-80°C.

The composition is finally adjusted to pH 6-6.6 using triethanolamine, where necessary.

25

Compositions 1 & 2 were evaluated for their make-up removal efficacy against a commercially available product, and were also tested for the deposition of lactic acid that occurred after use on human skin.

30

Make-up Removal Efficacy

Compositions 1 and 2 were assessed for their make-up removal efficacy, against the commercially available  
35 product Oil of Ulay Water Rinsable Cold Cream.

This product contains water, mineral oil, polyalphaolefin, glycerin, isododecane, sorbitan stearate, cyclomethicone,

- 12 -

Example 4

The following composition provides a cleansing lotion according to the invention.

5		
	<u>Component</u>	<u>% (w/w)</u>
	C <sub>11</sub> -C <sub>13</sub> isoparaffin (Isopar L, ex. Exxon)	5.0
	Caprylic/capric triglyceride (Miglyol 810,	
10	ex.Huls)	15.0
	Myristyl lactate (Crodamol ML, ex. Croda)	2.0
	Cetearyl alcohol (Alfol 1618, ex. Condea)	3.0
	Ceteth 21 (Brij 721, ex. ICI)	1.0
	Propyl paraben (Nipasol M, ex. Nipa)	0.1
15	Propylene glycol (ex. BASF)	3.0
	Triethanolamine (ex. BASF)	0.2
	Carbomer 934 (Carbopol 934, ex. Goodrich)	0.2
	Methyl paraben (Nipagin M, ex. Nipa)	0.2
	DMDM hydantoin (Glydant, ex. Lonza)	0.2
20	Perfume	q.v
	Water	to 100

Example 5

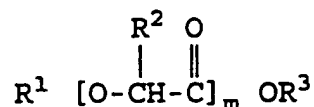
25 The following composition provides an aerosol cleansing mousse composition according to the invention.

	<u>Component</u>	<u>% (w/w)</u>
30	Isopropyl myristate (Estol 1514, ex. Unichema)	25.0
	PEG-8 laurate (Clihrol 4ML, ex. Croda)	6.0
	Myristyl lactate (Crodamol ML, ex. Croda)	2.0
	Glycerine (ex. Unichema)	2.0
	Butane (Cap 30, ex. Calor)	5.0
35	Water	to 100

CLAIMS

- 5 1. A skin cleansing composition for topical application to the human skin to remove make up therefrom comprising an oil-in-water emulsion containing a hydroxy alkanoate derivative compound of the following general formula:

10



15

wherein  $R^1$  is H- or  $C_xH_y-C(=O)-$   
 $R^2$  is H- or  $C_pH_q-$   
 $R^3$  is H-,  $C_xH_y-$ , or a metallic, ammonium, or  
 20 alkylammonium cation,  
 p is an integer from 1 to 18,  
 q is an integer from 3 to 37,  
 x is an integer from 2 to 20,  
 y is an integer from 1 to 3,

25

provided that when  $R^1$  is H-, then  $R^3$  is  $C_xH_y-$ , and  
 when  $R^1$  is  $C_xH_yCO-$ , then  $R^3$  is H-, or a metallic,  
 ammonium or alkylammonium cation.

- 30 2. A cleansing composition according to claim 1 wherein  $R^2$  is H or  $CH_3$ .
3. A cleansing composition according to claim 1 or claim 2, wherein the hydroxyalkanoate derivative has an HLB  
 35 value of less than 5.5.
4. A cleansing composition according to any one of the preceding claims, wherein the oil phase comprises a mineral oil, a hydrocarbon oil, or an ester which

contains a saturated or unsaturated straight or branched C<sub>8</sub>-C<sub>22</sub> alkyl or alkenyl chain, or mixture thereof.

- 5 5. A cleansing composition according to any one of the preceding claims wherein the amount of oil in the oil phase of the emulsion is 3 to 60% by weight of the composition and the amount of the hydroxy alkanoate derivative is 0.5 to 7% by weight of the composition.
- 10 6. A method of removing cosmetics from human skin, comprising:

- 15 (i) applying to skin with make up thereon a skin cleansing composition which has an oil-in-water emulsion containing a hydroxy alkanoate derivative compound of the following general formula:



- 25 wherein  $R^1$  is H- or  $C_xH_y-\overset{\overset{O}{||}}{C}-$   
 $R^2$  is H- or CH<sub>3</sub>  
 $R^3$  is H-, C<sub>x</sub>H<sub>y</sub>-, or a metallic, ammonium, or alkylammonium cation,  

30 p is an integer from 1 to 18,  
q is an integer from 3 to 37,  
x is an integer from 2 to 20,  
y is an integer from 1 to 3,

- 35 provided that when  $R^1$  is H-, then  $R^3$  is C<sub>x</sub>H<sub>y</sub>-, and when  $R^1$  is C<sub>x</sub>H<sub>y</sub>CO-, then  $R^3$  is H-, or a metallic, ammonium or alkylammonium cation, and

- (ii) wiping, washing or rinsing said emulsion from the skin.

7. A method according to claim 6 wherein  $R^2$  is H or  $CH_3$ .
8. A method according to claim 6 or claim 7, wherein the hydroxyalkanoate derivative has an HLB value of less than 5.5.
9. A method according to any one of claims 6 to 8, wherein the oil phase comprises a mineral oil, a hydrocarbon oil, or esters which contain a saturated or unsaturated straight or branched chain  $C_8$ - $C_{22}$  alkyl or alkenyl group, or mixtures thereof.
10. A method according to any one of claims 6 to 9 wherein the amount of the oil is 3 to 60% by weight of the emulsion and the amount of the hydroxyalkanoate derivative is 0.5 to 7% by weight of the emulsion.
11. Use of a hydroxyalkanoate derivative as defined in any one of claims 1 to 3 as an emulsifier in a composition for removing make up from human skin.

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 6 A61K7/02 A61K7/50

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 A61K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP,A,0 541 347 (UNILEVER) 12 May 1993 ----	
A	EP,A,0 150 914 (UNILEVER) 7 August 1985 -----	

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

\* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search

30 November 1994

Date of mailing of the international search report

14.12.94

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+ 31-70) 340-3016

Authorized officer

Klaver, T



Patent document cited in search report	Publication date	Patent family member(s)		Publication date
EP-A-0541347	12-05-93	AU-A-	2818792	13-05-93
		CA-A-	2081932	08-05-93
		JP-A-	6192036	12-07-94
-----				
EP-A-0150914	07-08-85	AU-B-	560740	16-04-87
		AU-A-	3728685	18-07-85
		CA-A-	1236021	03-05-88
		GB-A, B	2153224	21-08-85
		US-A-	4613592	23-09-86
		US-A-	4772592	20-09-88
-----				

**This Page Blank (uspto)**

**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record**

**BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☒ **BLACK BORDERS**
- ☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☒ **FADED TEXT OR DRAWING**
- ☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☒ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☒ **GRAY SCALE DOCUMENTS**
- ☐ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER: \_\_\_\_\_**

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**

**This Page Blank (uspto)**